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Environmental

Subject

Aquifer Pumping Test Plan, Bally Public Water System, Berks County, Pennsylvania  
ARCADIS Project No. NP000568 0002 00007

Dear Mr. Fridirici:

Date  
February 20, 2004

This letter outlines the proposed methodology for conducting the 48-hour aquifer pumping test required by the Pennsylvania Department of Environmental Protection (PADEP) as part of the permitting process for a new groundwater community water source. This plan is being presented to the PADEP to ensure that the PADEP understands ARCADIS' proposed aquifer pumping test methodology, and to ensure PADEP's concurrence with these methods.

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**Locations**

The aquifer pumping test will be conducted in Washington Township, Berks County, Pennsylvania. A previously drilled six-inch diameter pilot boring located north of the Borough of Bally near Route 100 is the intended site for the proposed test well. The pilot boring is located at an elevation of approximately 455 feet above mean sea level (MSL). The location of the subject property, referenced as Parcel A, and the pilot boring are presented on Figure 1.

**Hydrogeology**

The pilot boring has been completed in the fanglomerate deposits associated with the Brunswick Formation of the Newark Group. These fanglomerate deposits, located just to the southeast of the Reading Prong, are composed of angular clasts of varying composition, in a matrix of red shale and sandstone. The composition of the fanglomerate is somewhat variable as it was dictated by the upslope geology at the time of deposition.

## **Static Water Levels**

Based upon data obtained during installation of the pilot borings and additional data collected during a screening sampling event, the groundwater surface elevation at the Parcel A location is approximately fifteen feet below ground surface.

## **Well Completion**

Prior to conducting the aquifer test, a test-well conforming to American Water Works Association (AWWA) specifications will be constructed on the Parcel A property. The test-well will be constructed by converting the pilot boring or by drilling a new borehole for the test well near the location of an existing pilot boring.

## **Pump Type and Setting**

A submersible pump will be used for the aquifer pumping test. The driller will supply the pump, which will have the capacity to produce between 350 and 450 gallons per minute and will be set in the production well at the deepest high-productivity zone encountered during the drilling of the well. This will maximize yield by maximizing the available drawdown, resulting in the most representative samples to be collected at the end of the test.

## **Test Duration**

The duration of the aquifer pumping test will be at least 48 hours as required by the PADEP and Delaware River Basin Commission (DRBC). Prior conversations with the PADEP and DRBC have confirmed that a 48-hour test should be sufficient for the proposed pumping locations. Additionally, recovery data will be collected using data loggers after the pumping and sampling phases are complete.

## **Monitoring**

### **Discharge Rate**

During the pumping test, the well discharge rate will be monitored using a flow meter and orifice/manometer to provide redundancy in the measurement of discharge. If there is a chance that the ambient air temperature will be below 32<sup>o</sup> Fahrenheit (F), the manometer will be allowed to flow freely between readings. Valves will be provided at the locations of both the flow meter and the manometer to

provide discharge rate control. Monitoring of the discharge rate will permit a more accurate analysis to be performed on the results of the aquifer test in the event that irregularities occur in the discharge during the course of the test. Flow will be monitored as frequently as possible and recorded on 15 minute intervals at a minimum.

## Water-Level Drawdown

During the aquifer pumping test, water levels will be monitored in the test well, observation well(s) and other relevant points to determine whether the proposed well influences nearby wells or surface water.

In accordance with general industry practices, two observation wells will be used to monitor drawdown during the aquifer pumping test. The data collected from the observation wells will allow the calculation of the transmissivity and storage coefficient of the aquifer.

One observation well will be installed within approximately 50 feet and the other observation well will be installed approximately 150 feet from the test well. The exact locations of the observation well(s) will be determined upon completion of negotiations regarding access to the test well site. **The observation wells will be drilled to approximately the same depth as the production well and will be six inches in diameter.** ARCADIS also anticipates using the existing private well on the Parcel A property to monitor drawdown during the pumping test.

Monitoring of water levels in the test and observation wells will be conducted using pressure transducers to collect time-drawdown data. The pressure transducers collect digital data that can be used to analyze the results of the aquifer test. The pressure transducers will be set to record data at a logarithmically increasing interval. The interval for the test well and observation well(s) will start with an interval of approximately one half second and progress to approximately fifteen-minute intervals.

## Surface Water and Wetlands

Nearby surface-water bodies, will be monitored to determine the influence, if any, of groundwater pumping. Surface water monitoring will be conducted using piezometers, or temporary stream gauges to monitor stream stage.

Wetland monitoring, including wetlands associated with the Upper Main Branch of the Perkiomen Creek, will also be conducted using piezometers. One piezometer will be installed in the portion of the wetlands closest to the pumping well. Wetlands without standing water will be visually monitored for evidence of pumping well effects during the aquifer pumping test. Piezometers will be installed so that their screened interval extends across the normal standing water level of the wetland. The piezometer will be instrumented with a pressure transducer to monitor the water level in the wetland during the pumping test. Approximately one week of background data will be collected at surface water monitoring points prior to the start of the aquifer pumping test.

#### **Climatic Data**

Climatic data will also be monitored before and during the aquifer test. Data collected will include precipitation and barometric pressure. Monitoring of climatic data provides the ability to compensate for changes in ground and surface water levels because of precipitation or changes in barometric pressure. The nearest climatic data station is located in Palm, Pennsylvania approximately seven miles northeast of Bally. The data are available online from the National Climatic Data Center (NCDC).

#### **Water Discharge**

Water produced during the aquifer pumping test will be handled in accordance with the requirements of the Berks County Conservation District (BCCD). Present data indicate that the water produced by the well will not pose an issue with regard to suspended sediment. As such, water will be discharged directly to nearby surface water bodies using proper erosion control techniques. Water will be discharged to a point downstream of any surface water monitoring points.

#### **Sampling and Analysis**

At the conclusion of the aquifer pumping test, water samples will be collected to assess the quality of the water produced by the well. The samples will be analyzed according to the requirements outlined in the most recent version of the Community and Non-Transient Non-Community Water Systems New Source Sampling Requirements for Groundwater Sources, as published by the PADEP. Samples will be sent to laboratories identified on the List of Commercial Certified Drinking Water Laboratories obtained from the PADEP Office of Water Management website. A full

set of duplicate samples will be collected in case any of the samples are broken during shipping; however only one set is required for analysis. Additionally, the EPA has indicated that it would like to collect duplicate samples for analysis.

The hydrogeological data collected from the production and observation wells (drawdown and discharge changes with respect to time) during the aquifer pumping test will be analyzed to determine the hydrogeological properties of the fanglomerate. The specific method(s) used to analyze the hydrogeological data (e.g. Theis, Cooper-Jacob, etc.) will be selected after the data have been collected and reviewed. Laboratory analytical data from the samples collected at the conclusion of the test will be used to define the quality of water produced by the well.

## Follow up

Upon the completion of the aquifer test analysis a hydrogeologic report will be prepared and submitted with the well permit application, per PADEP requirements.

If you have any questions or comments regarding this plan, please contact us as soon as possible.

Sincerely,

ARCADIS G&M, Inc.



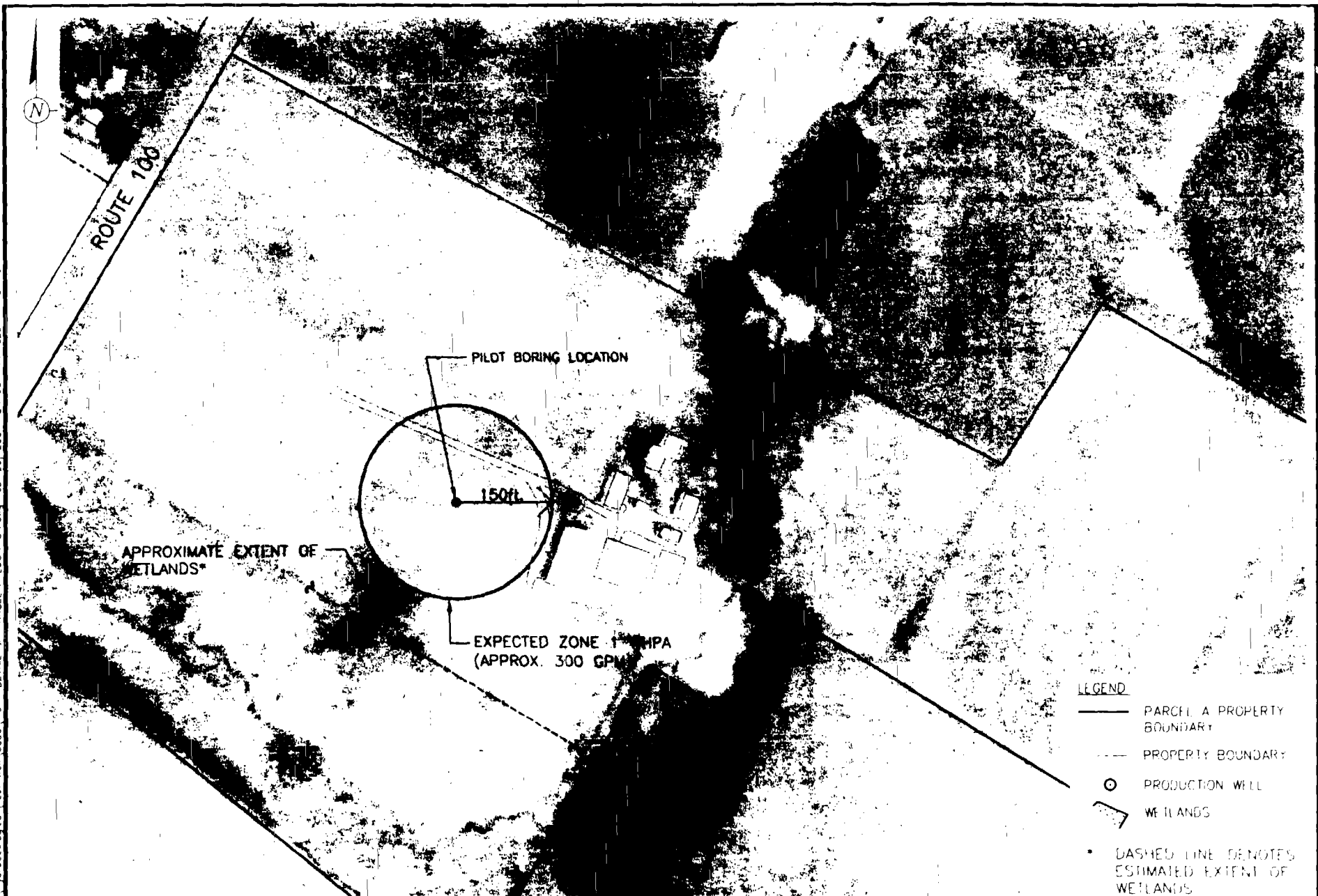
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SCALE 1" = 200'

**ARCADIS**



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